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## MEMORANDUM

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**TO:** INSTRUCTOR RADECSKY  
**FROM:** NICK CARTER  
**SUBJECT:** SERC AND CCAT VISIT  
**DATE:** OCTOBER 4, 2013  
**CC:** OMAR AL-SHAFIE

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### **Purpose**

The purpose of this memorandum is to discuss the site visits to the SERC and CCAT facilities located on the HSU campus. We learned about the programs and research being done by each of the facilities. We are trying to obtain a better understanding of the opportunities that HSU has to offer, as well.

### **Discussion**

One of the design projects at the Schatz Energy Research Center was the research of the hydrogen fuel cell. At SERC they are researching into hydrogen fuel cells in automobiles. The lab has been provided a car from Toyota that runs with a hydrogen fuel cell. The lab has the only hydrogen fueling station north of San Francisco.

There are many environmental benefits to using the fuel cell. One benefit is that there is no reliance on any fossil fuels to run the car. The fuel cell car has zero emissions; the only substance it releases is water from the exhaust pipe. Another benefit is that the car is fuel efficient and cost efficient for fueling the vehicle. The social benefits of the car include better economic value for traveling; the energy is renewable so there would not be a shortage of the hydrogen. This technology would help reduce air pollution thus creating a better environment and living environment for everyone.

There are some drawbacks to this research though. The electricity to power the process of separating the hydrogen comes from "the grid" so unless that energy is from renewable and clean sources, then the whole process is not emission free. The cars and fuel cell are going to be expensive to produce so they will be expensive on the market. The battery that the car uses is also very inefficient after the duration of its life. The batteries are expensive and harmful to dispose of once they have been completely used.

I would be very interested in becoming a part of the project that is converting the heat from exhaust to energy to power a car. I have been interested in a similar project to capture the heat from the vehicle and reuse that energy. The project seems interesting to me because there is a lot of waste when it comes to internal combustion engines and cars. If the heat released would be able to be used again, cars and other vehicles would be more efficient.

### **Conclusion**

The most interesting part of the field trip was learning about the hydrogen fuel cell car. I had heard many things about that technology but had never seen what goes into it, or the vehicle itself. I found the car and the fueling station intriguing. The SERC and CCAT were both very interesting because I was able to see what some engineers could do and some of the research that goes on at HSU's campus. It was a great learning experience.